

ORDER

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PROJECT IMPLEMENTATION PLAN

MULTICHANNEL VOICE RECORDER SYSTEM



OCTOBER 13, 1989

**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**

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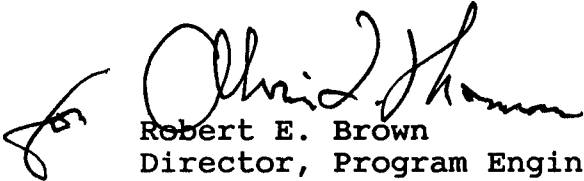
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FOREWORD

This order set forth the project implementation plan (PIP) for planning and implementing the Multichannel Voice Recorder System. This order provides management directive and technical guidance in the implementation of the project to all levels of the FAA from project inception through deployment.



Robert E. Brown
Director, Program Engineering Service



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CHAPTER 1. GENERAL

1. PURPOSE. This project implementation plan (PIP) provides overall guidance and direction for the establishment of multichannel voice recorders at new sites and replacement at all existing 5 or 9 channel recorder sites.

2. DISTRIBUTION. This order is distributed to division level in the Program Engineering, Systems Maintenance, Air Traffic Plans and Requirements, and Logistics Services in Washington headquarters; to branch level in the regional Airway Facilities division; to branch level in the FAA Academy and FAA Depot at the Mike Monroney Aeronautical Center; to branch level in the Facilities and Engineering Divisions at the FAA Technical Center; and a standard distribution to all Airway Facilities field offices.

3. AUTHORITY TO CHANGE THIS ORDER.

a. Authority. This plan is issued under the authority of the Director, Program Engineering Service, APS-1. The authority to issue changes to this order is reserved for APS-1.

b. Applicability. The information contained herein shall be used by FAA offices, services, regions, centers (Mike Monroney Aeronautical Center and FAA Technical Center), project sites, and contractor personnel for their support of implementation activities for the multichannel voice recorder project. The guidance and schedule information provided herein shall form the framework for those organizations in the more detailed planning activities required at the regional and field level. Deviations from this plan must be approved by the Director, Program Engineering Service, APS-1.

c. Duration. The duration of this project shall continue through to the last multichannel voice recorder system delivery to the FAA Depot.

4. DEFINITIONS. The multichannel voice recorder system associated with this project is a 10 or 20 (10/20) channel recorder/reproducer system. These terms are used interchangeably throughout the document.

5.-19. RESERVED.



CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS. The National Airspace System (NAS) Plan project 02-11, multichannel voice recorders, will provide for the recording of all voice communications between aircraft pilots and air traffic controllers at airport traffic control towers (ATCTs), and between pilots and flight service specialists at Flight Service Stations (FSSs) or Automated FSSs (AFSSs). This document provides management direction, program reference material and project guidelines for this multiyear effort of implementing the Multichannel Voice Recorder system.

21. PURPOSE. This project provides for installation of 10 or 20 channel recorders at new sites, and for replacement of existing 5 or 9 (5/9) channel recording equipment at ATCTs, FSSs, and AFSSs (Regions will determine the most practical deployment of the recorders). This will promote modernization of these facilities, which is the main objective of the NAS plan.

a. The recording of controller/pilot and flight service specialist/pilot voice communications is required to assure adequate records in the event of incidents or accidents and to improve communication techniques of the personnel involved. Voice recording provides a means of event reconstruction in which a sequence of events and their time of occurrence can be analyzed.

b. Recording of voice communications at ATCTs and FSSs/AFSSs is generally accomplished based on control positions as identified in the latest edition of Order 7210.3, Facility Operation and Administration.

c. Frequency recording is provided where additional unused recording channels are available. Frequency recording involves the utilization of a single recorder channel for each specific frequency in use at the facility.

d. Time source recording is provided on at least one recorder channel. Time source recording is provided in Manchester code multiplexed on all recorder channels.

e. Additional unused channels may also be used to record intrafacility communications between controllers or specialists.

22. HISTORY. recording communications with the 5/9 channel recorders at the ATCTs, FSSs, and AFSSs is no longer practical. This equipment utilizes vacuum tube technology which is obsolete, does not meet FAA reliability, maintainability and availability (RMA) requirements, and has severe supply/support problems.

a. In February 1986, the FAA awarded a contract to Dictaphone Corporation, which provided 100 units of 10 channel and 25 units of 20 channel recording equipment. After establishment of this equipment at several sites, a few shortcomings were noticed:

(1) For recording analysis at a distant location, the entire tape reel consisting of 10 or 20 recorded channels must be shipped even if there is only a portion of a single channel of interest.

(2) The tape can only be played at locations with similar 10/20 channel recording equipment. To play the tape at any other location a portable 10/20 channel reproducer unit must also be transported.

b. In November 1986, a procurement request was released which incorporated modifications to the recording equipment in order to overcome the above shortcomings. This additional procurement includes a 2-channel cassette recorder as part of the 10/20 channel recording equipment. The 2-channel cassette recorder uses tapes similar to audio cassette players, thus resolving present transportation and playback problems. This procurement contract was also awarded to Dictaphone Corporation, and calls for 170 units of 10-channel and 123 units of 20-channel recording equipment, each with a built-in 2-channel recorder. This project implementation plan addresses issues relating to the second (10/20 channel additional) procurement of recording systems.

23.-29. RESERVED.

CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION. The Multichannel Voice Recorder is a component of terminal and flight advisory Air/Ground communications as described in the NAS plan. The procurement of present day 10/20 channel recorders will assist in the modernization of ACTCs, FSSs and AFSSs. The 10/20 channel recorders are commercially available replacements for the existing 5/9 channel recorders used at ATCTs, FSSs and AFSSs. Multichannel Voice Recorder equipment containing the logging recorder/reproducer system provides for the recording of 10 or 20 audio channels in a single cabinet. The equipment directly interfaces with communications systems at FSSs, AFSSs, and ACTCs. The recorder unit routinely records all controller-pilot or specialist-pilot voice communications for a 24 hour period on a single reel of tape. The 10/20 channel recorder system provides the following functional features:

a. The Recorder/Reproducer Unit.

(1) The record feature is activated by a push button located on the tape deck front panel. This feature permits the archiving of the audio signal.

(2) The fast forward feature is activated by a push button located on the tape deck front panel. This feature permits the operator to advance the tape at accelerated speeds.

(3) The rewind feature is activated by a push button located on the tape deck front panel. This feature permits the operator to rewind the tape to review the recording.

(4) The play feature is activated by a push button located on the tape deck front panel. This feature permits the operator to monitor the audio signal through the internal speaker.

(5) The stop feature is activated by a push button located on the tape deck front panel. This feature permits the operator to halt the advancement of the tape.

(6) The search feature is activated by a push button located on the tape deck front panel. This feature permits the operator to initiate the tape deck to determine the location of an event at 700 times the normal recording speed, when provided with the date and time of the event of interest. Both manual and automatic search features will be supported. The automatic search feature can advance/rewind the tape at high speed to the message with the selected date and time. It also has a manual override function.

(7) The record monitoring feature is activated by push buttons located on the tape deck front panel. This feature permits the operator to monitor the incoming audio signal through the internal speaker while the audio signal is being recorded.

(8) The fail-safe/scan feature is activated by push buttons located on the tape deck front panel. This feature electronically monitors the recording capability of each channel and provides a visual indication to the operator when failure occurs.

(9) The failure detection system electronically monitors the recording capability of each channel of the system as it records. On detection of failure in the primary deck, it automatically transfers operation to the standby deck with provision for manual override. This automatic switching feature safeguards against loss of data during failure.

b. The Portable Reproducer Unit has the record, fast forward, rewind, play, stop and search functions and the capability for setting and displaying search times, dates and channels, similar to the Recorder/Reproducer Unit.

(1) The cassette rerecording feature provides a convenient interface with a 2-channel cassette recorder to record Inter Range Instrumentation Group-E (IRIG-E) time code on one channel and any selected voice channel on the other.

(2) The setting and display indicators show a variety of switch settings (e.g. time/date, power on/off, channel and recorder status etc.).

(3) A built-in 2 channel cassette recorder is provided to record the time code in IRIG-E format (a 100 Hz positive signal phasing at the $2.5\text{VPP} \pm 1\text{VPP}$) on one channel and selected channel on the other with the record feature being switchable to operate in either a continuous or voice activated mode.

31. PHYSICAL DESCRIPTION. The 10/20 channel dual deck logging recorder/reproducer system consists of two major subsystems:

a. The Recorder/Reproducer Unit consists of a cabinet, dual decks, one take-up reel per deck, primary and backup power supplies system, an audio system, a failure detection system, an automatic search system, and a time/date code generating and reading system.

(1) Each deck of the dual deck system functions as a standby for the other deck in the event of tape run-out, tape breakage, or any other recording interruption. Each deck is capable of at least 24 hours of continuous recording time on 1/2 inch tape for the 10 channel recorder and 1 inch tape for the 20 channel recorder, using 3600 feet of 1.0 mil base tape and operating at a recording speed of 15/32 inches per second (IPS).

(2) The bulk-erase head component has the capability to completely clean tapes prior to recording. A tape bulk-eraser is a component of the recorder.

(3) The cabinet housing the entire Unit has outside dimensions which are same as that of a standard 83 inch equipment rack.

(4) The Time/Date Code Generator Unit multiplexes a time code signal with the recorded audio track to accurately log the time at which the recording was made. The multiplexed signal will become the recording of the voice communications along with the timing of its occurrence.

(5) The remote mode indicator displays the status of each deck and provides an audible alarm with variable loudness control. The indicators are approximately 1.75 inches high, 8 inches wide and 6 inches deep.

(6) The tape deck is serviceable from the front and the tape transport swings out from the cabinet for easy accessibility to all components. Each tape transport uses a standard 10 1/2 inch NAB reel without auxiliary hub adaptors. The tape-head assemblies are plug-in replaceable.

(7) All electronic circuits are modular in construction and designed for quick replacement by using plug-in cards.

b. The Portable Reproducer Unit consists of a cabinet, a tape playback deck, an automatic search system, and a 2-channel cassette recorder system.

(1) The tape playback deck provides at least 24 hours of continuous playback time on 1/2 inch tape for 10 channel and 1 inch tape for 20 channel recorders, using 3600 feet of 1.0 mil base tape, and operating at a speed of 15/32 IPS.

(2) The entire reproducer unit is transportable with carrying handles on a portable case. Outside dimensions are approximately 34 inches in height, 24 inches in width and 20 inches in depth. Equipment can be powered from any convenient a.c. source by use of the power cord supplied with each unit.

(3) The reproducer unit is also furnished with the automatic search capability and a foot control assembly to operate the search system.

(4) The tape head assemblies are easily replaceable and the tape deck swings out from the cabinet for easy accessibility to all components. Each tape transport uses a standard 10 1/2 inch NAB reel without auxiliary hub adaptors.

(5) All electronic circuits are modular and designed for quick replacement by using plug-in cards. Other features of the portable reproducer are similar to those of the recorder/reproducer unit.

32. SYSTEM REQUIREMENTS. Both the recorder/reproducer and portable reproducer units have power requirements of 115 Volts, 60 Hz, single phase a.c. current.

a. The recorder/reproducer unit is supplied power from a single power supply with a back-up. Terminals for the audio input lines are conveniently available and accessible from the rear or the front of the cabinet. The power supply circuit breaker for each deck is located on the front panel of the recorders.

b. The Time/Date code generator unit is equipped with battery backup to supply power during power outages for a period of at least 2 hours. A built-in battery charger is capable of recharging the battery unit in less than 14 hours without monitoring or manual intervention.

33. INTERFACES. Recorder inputs are connected with voice signal outputs from communications switching system using standard electrical wiring techniques. Recording systems are also equipped with IRIG-E interfaces to coded time sources at facilities equipped with that feature.

34.-39 RESERVED.

CHAPTER 4. PROJECT SCHEDULE AND STATUS

40. PROJECT SCHEDULES AND GENERAL STATUS Two project activity schedules are provided in appendix 1. These schedules depict both the initial procurement and the additional procurement which includes the 2-channel cassette recorder along with the 10/20 channel recording equipment. Appendix 1, paragraph 1 contains activities on the initial and additional procurement which have been completed; their projected completion dates are dynamic in nature and are, therefore, subject to change.

41. MILESTONE SCHEDULE SUMMARY. The Multichannel Recorder Program schedule is sectioned into the following four areas: acquisition, production, testing and implementation. Milestones for the initial procurement of the 10/20 channel recorder have been completed. The following is a summary of the schedule milestones for the additional procurement of 10/20 channel recording equipment.

a. The acquisition phase began with the Procurement Request which was released in January, 1987. The solicitation was issued in August, 1987. The acquisition phase was concluded in January, 1988.

b. The production phase began in April 1988 with the delivery of the provisioning technical documentation and will continue until the last system is delivered to the FAA Depot.

c. The testing phase began in May, 1988 with an approved Factory Acceptance Test (FAT) plan and will end with the completion of the last FAT.

d. The implementation phase will consist of the time period between the first delivery in June, 1988 and end with the last delivery to the FAA Depot.

42. INTERDEPENDENCIES AND SEQUENCE. There is no relationship between this project and others, in terms of scheduling and implementation sequencing.

43.-49. RESERVED.



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CHAPTER 5. PROJECT MANAGEMENT

50. PROJECT MANAGEMENT, GENERAL. Program direction for the Multichannel Voice Recorder project is provided by the Federal Aviation Administration (FAA) policies and procedures as defined by current FAA directives, and by active direction from management at the FAA service director level.

a. The Multichannel Voice Recorder project is now being implemented in accordance with the applicable provisions of the latest edition of Order 1810.1, Major Systems Acquisition.

b. Overall responsibility for implementation of the Multichannel Voice Recorder project has been assigned to the Director, Program Engineering Service APS-1. This order directs the Facilities and Equipment (F&E) program manager assignments and program review procedures.

51. RESPONSIBILITIES.

a. Director, Program Engineering Service, APS-1 has the overall responsibility for the implementation of the Multichannel Voice Recorder project and provides program direction.

b. Program Office, APS-540, will develop, coordinate, and monitor the program from the engineering/production cycle through the delivery cycle.

c. Materiel Management Division, ALG-200, provides coordination of logistics support concurrent with the delivery of equipment.

d. The Contracts Division, ALG-300 is responsible for procuring, contract award and administration, and monitoring the administrative flow of material between the manufacturer and the FAA.

e. The Industrial Division, ALG-400 is responsible for assigning a Quality and Reliability Officer (QRO) to ensure that test and performance criteria agree with FAA standards and tolerances, and will assign an in-plant QRO to monitor the contractor's quality control program.

f. National Airway Engineering Field Support Sector, ASM-150 is responsible for updating maintenance of multichannel recorders, blue sheet tolerances, PM schedules, standards, tolerances, time code specifications, performance checks and procedures of Order 6670.4A, and has the responsibility to assign tasks and frequency of maintenance on all equipment of the multichannel voice recorder system. This office is also responsible for development of installation handbook, maintenance procedures, modification, and technical field support.

g. Mike Monroney Aeronautical Center, AAC-1 will provide the centralized training and logistics support for the Multichannel Voice Recorder system. These functions will be accomplished principally by the FAA Depot and FAA Academy in coordination with other center staff and support organizations and personnel. Specific functions are further defined as:

(1) The FAA Academy, AAC-900 will establish and maintain a training course for site personnel involved with the maintenance of all equipment delivered under the contract of this program.

(2) FAA Depot, AAC-400, will provide logistics and engineering support, including the establishment and maintenance of a spares inventory and provision of repairs for returned equipment.

(3) The Mike Monroney Aeronautical Center Staff and Support Organizations, will provide engineering, installation, and maintenance support for all program equipment provided to the center for training, quality assurance, or second-level support. This support will be coordinated with the FAA Depot, the FAA Academy, and tenant organizations.

h. Regional offices have responsibility for each designated site. This responsibility includes the site peculiar engineering and implementation activities of site relocation, site preparation and checkout for operational turnover, as well as training and staffing. The regional coordinator will act as a focal point for coordination and scheduling during project implementation.

i. Office of Personnel and Technical Training. Reserved.

j. Office of Budget. Reserved.

52. PROGRAM PROCEDURES. The Multichannel Voice Recorder project will be implemented in accordance with existing FAA procedures.

a. Implementation management requires the development of this Project Implementation Plan (PIP) to assure the orderly introduction of the production system into the NAS. Revisions, updates, and reissues of this plan will be disseminated by the project office.

b. Fiscal status will be provided during program reviews. The latest edition of Order 2510.5, Fiscal Programming and Reporting Procedures for the Facilities and Equipment Appropriations, establishes quarterly review procedures for the reporting and review of the fiscal status of projects included in the program.

c. Logistics support procedures established by the latest edition of Order 4560.1, Initial Provisioning for Support of Facilities, Facility Components, Aircraft and Avionic Equipment will be followed to establish range and quantity of spare parts needed to

support the recorders. The latest edition of Order 4620.3, Initial Support for new or Modified Equipment Installation, establishes responsibilities for developing the Initial Supply Support Allowance Chart (ISSAC) items which reflects the range and quantities of items of supply required for onsite support of recorders. The acquisition and material service will coordinate logistic support requirements in accordance with AAF NAILS policy per the latest edition of Order 1800.58, National Airspace Integrated Logistics Policy.

d. Configuration management will use the policies and procedures established by the latest edition of Order 1800.8, National Airspace System Configuration Management, for the end items specified in NAS-MD- 001, NAS Air Traffic Control Subsystem Baseline Configuration. The Multichannel Voice Recorder equipment baseline will be established in the installations standards handbook. Changes to this baseline, up to the date of initial site operational availability, will not require FAA change proposal activity, only concurrence by the project manager. Subsequent to initial site operational availability, all change proposals will be coordinated in accordance with Order 1800.8.

53. PROJECT MANAGEMENT COMMUNICATIONS. The A/G Communications Program Manager (APS-540) is the focal point for all internal communications. In order to successfully proceed with project deployment and operational cutover, APS-540 must be aware of all significant program activities. In addition to this direct interface with the program manager/technical officer (TO), the program office will ensure that the necessary information is made available to the organizations having action responsibility. EACH RESPONSIBLE ORGANIZATION WILL DESIGNATE IN WRITING TO APS-540 A MULTICHANNEL VOICE RECORDER PROJECT COORDINATOR AND AN ALTERNATE FOR REGIONAL IMPLEMENTATION ACTIVITIES. THE COORDINATOR WILL BE IDENTIFIED BY NAME, ORGANIZATION CODE AND TELEPHONE NUMBER.

a. Contractor communications are authorized only for specific purposes, in accordance with FAA policy. The contracting officer (CO) has the direct contract responsibility and is responsible for all contractual matters and is the only person authorized to approve changes that will impact price, delivery, or schedule.

(1) The contracting officer has been designated from the Acquisition and Materiel Service (ALG). The Aircraft, Interfacility and Safety Branch, ALG-330, is the office responsible for all contractual matters.

(2) The Manager, A/G Communications Program, APS-540, has been designated as the program manager. A project manager has been designated from the APS-540 staff who will also be the technical officer (TO). Therefore, APS-540 is authorized to interface with the contractor's representatives concerning technical issues.

54.-59. RESERVED.

CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. Implementation of the Multichannel Voice Recorder project corresponds with policies and guidelines established in the latest edition of DOT Order 4200.14, Major Systems Acquisitions Review and Approval, and FAA Order 1810.1, Major Systems Acquisition. The regions will implement the project in accordance with this order.

61. FUNDING POLICY. The funding policy of the project is to base all allocations on detailed cost estimates. All costs relating to engineering, testing, installation, and contract monitoring, as well as the cost associated with site preparation work and the initial logistic support, are provided from Multichannel Voice Recorder project funds.

62.-69. RESERVED.



CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. Deployment of the 10/20 channel recording equipment will be made to the FAA Depot. Equipment will then be requisitioned from the FAA Depot by the regions.

71. SITE PREPARATION. Regions are responsible for preparing sites at new establishments. site preparation may not be required at sites where the 5/9 channel recording equipment is to be replaced by the 10/20 channel recording equipment. Site preparation work will be included in the facility installation plan.

a. Government Furnished Equipment (GFE) and services listed below will be provided, installed, or both, where applicable.

(1) Cables to connect the contractor provided remote status alarm panel with the Multichannel Voice Recorder. Additional cables/wiring to connect voice signals from the communications switching system to recorder inputs.

(2) Drawings of the site interface data of those facilities necessary, for the development of the installation plan.

(3) Any test equipment necessary for routine maintenance.

(4) Necessary space, power, lighting, heating, air conditioning and electrical grounding for Multichannel Voice Recorder installation.

72. DELIVERY. Delivery to the FAA Depot will consist of 30 units within 120 days after date of delivery order. The balance of the units will be delivered at a rate of 30 units in 30 day intervals after the first delivery, as ordered.

73. INSTALLATION PLAN. At new establishments, installation instructions for individual items such as recorders, equipment racks, etc., will be included in the overall facility installation plan. Installation instructions for equipment being replaced at an operating facility will be derived from contractor provided instruction book.

74.-79. RESERVED.



CHAPTER 8. VERIFICATION

80. FACTORY VERIFICATION. Factory verification conducted prior to shipment of the equipment will follow the contractor's final test procedures.

81. CHECKOUT. The contractor's test plan will be used for system checkout to verify the equipment operational capability.

82. CONTRACTOR INTEGRATION TESTING. Not Applicable.

83. CONTRACTOR ACCEPTANCE INSPECTION (CAI). Not Applicable.

84. FAA INTEGRATION TESTING. NAS integration testing will be conducted as described in the Multichannel Voice Recorder Master Test Plan (MTP).

85. SHAKEDOWN AND CHANGEOVER. The 10/20 channel recording equipment will be integrated by simultaneously operating it with the 5/9 channel recording equipment. The 5/9 channel equipment will be decommissioned once successful operation and full functionality of the new equipment is assured.

86. JOINT ACCEPTANCE INSPECTION (JAI). Joint Acceptance Inspections (JAI) must be completed for FAA Facilities in accordance with the latest edition of Order 6030.45, Joint Acceptance Inspections for FAA Facilities.

87.-89. RESERVED.



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CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

90. MAINTENANCE CONCEPT. Maintenance will be accomplished in accordance with the concept outlined in the latest edition of Order 6000.15 and the policy of field repair contained in the latest edition of Order 6000.18. The physical location of the recorders within ATCTs, FSSs and AFSSs must allow for frequent visual checks of the equipment, since the recorders are not presently monitored by the Remote Maintenance Monitoring System (RMMS). Onsite repair and maintenance shall be accomplished whenever possible. Regional maintenance responsibility will be limited to management of the Airway Facilities (AF) workforce to ensure that sufficient qualified personnel are assigned to maintenance sectors or work centers. Regions will also be responsible to ensure proper calibration of test equipment. Maintenance will be performed at three levels.

a. Onsite Maintenance is limited to detection, isolation and replacement of faulty Line Replaceable Units (LRU) and other serviceable spares by local maintenance technicians based on procedures developed by personnel at the Maintenance Control Center (MCC). The defective components will be returned for FAA Depot level analysis, testing, repair and disposition as appropriate. Onsite repair of LRUs is not authorized. Onsite maintenance tasks include maintaining inventory of spare parts by ordering replacement parts, exchanging defective modules designated for Exchange and Repair (E&R) with serviceable units from the FAA Depot, installing modification kits and minor field modules and circuit cards after expiration of the warranty period, engineering changes and repair of authorized components.

b. Depot Maintenance will consist of diagnostic and bench testing of faulty LRUs and repair or disposal as appropriate. The FAA Depot maintenance personnel will be responsible to perform diagnostic fault isolation on defective components, repair of selected and repairable modules and cards using Depot E&R procedures, and maintain inventory of spare parts. Factory repair may be recommended for those modules and circuit boards which have a low failure rate, are complex in nature or require expensive test equipment.

c. Factory Maintenance includes the repair of all faulty units returned to the factory.

91. TRAINING. The existing training proposal requires the training of 250 AF maintenance technicians to support 125 previously acquired recorder systems. The new procurement for recorder equipment will generate an additional requirement to train maintenance technicians using the same 2:1 ratio.

a. AF maintenance personnel training requirements will be fulfilled with a residents course which will consist of lecture and

hands-on training. The FAA Academy Airway Facilities Branch, AAC-940, will develop this course and all required training materials, using contractor furnished recording equipment and test manuals. Contracting Officer Technical Representative (COTR) responsibilities have been assigned to AAC-940.

b. Air Traffic (AT) personnel training requirements are not considered significant enough to warrant development of an independent training course. Operational tasks for the new recorders will be adequately described by onsite AF personnel. Formal training on recorder equipment will not be provided to AT personnel.

c. Special training requirements for FAA Depot personnel are not anticipated as analyzed and reported by AAC-940. FAA E&R support strategies negate the need for special training of FAA Technical Center Personnel.

d. Attrition training requirements for AF personnel is set at 10% of the initial training requirement annually.

92. SUPPORT TOOLS AND TEST EQUIPMENT. Test equipment and tools will be provided in accordance with the Integrated Logistic Support Plan (NAILS) to locate system malfunctions and perform routine maintenance.

93. SUPPLY SUPPORT. All supply support, spare equipment and systems, will be stored at the FAA Depot. The contractor is required to provide a one year supply of parts-peculiar as defined in FAA-STD-034 and approved by the Government at the Provisioning Conference as site level spares and/or depot level spares. Contractor recommendations for sparing levels will be documented in the Provisioning Technical Documentation. Additionally, there is a contract option to provide equipment repair for 19 months after the date of delivery order. During the term of this contract option, the contractor will furnish all qualified labor, materials and tools to repair recorders as requested by the Government. The repair to be performed at the contractor's facility will consist of:

a. Emergency Repair to be accomplished within twenty-four hours after the receipt of any equipment component by the contractor.

b. Routine Repair to be completed within thirty calendar days after date of receipt by the contractor.

94. VENDOR DATA AND TECHNICAL MANUALS. Two commercial Instruction Books in accordance with appendix I, table I of document FAA-D-2494b, will be provided with each delivered unit. Additional commercial instruction books will be provided within 120 days after date of delivery order for use by the FAA Academy.

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95. EQUIPMENT REMOVAL. The excess 5/9 channel recording equipment will be removed and disposed of according to the latest edition of Order 4800.2 and applicable regional procedures concerning disposition of excess property.

96. FACILITIES. The implementation of the Multichannel Voice Recorder project will enhance existing facility operation.

97.-99. RESERVED.



APPENDIX 1. GENERAL MULTICHANNEL VOICE RECORDER SCHEDULES

1. Purpose. This appendix contains scheduling information pertinent to the implementation of the Multichannel Voice Recorder project and may be updated (by APS-1) without requiring modifications to this plan. Paragraphs within this appendix include:

2. Major Milestones Completed.

<u>ACTIVITY DESCRIPTION</u>	<u>EFFECTIVE DATE</u>
<u>Initial Procurement</u>	
Procurement Request released for equipment	June 25, 1985
Solicitation Issued	September 10, 1985
Cost/Technical Review Completed	December 2, 1985
Contract Award	February 21, 1986
System Delivered to First Operational Site	July 31, 1986
PTD/Logistics Support Analysis Delivered	August 1, 1986
Integrated Logistics Support (ILS) Plan App.	August 29, 1986
First Operational Readiness Date	September 15, 1986
Last System Delivered to Depot	September 29, 1986
Site Spares Delivered	February 29, 1988
<u>Additional Procurement</u>	
Procurement Request released for equipment	January 30, 1987
Solicitation Issued	August 18, 1987
Cost/Technical Review Completed	September 30, 1987
Contract Awarded	January 15, 1988
First Delivery Order Awarded	January 21, 1988
DRR Report Delivered	April 14, 1988
Factory Acceptance Test Approved	May 10, 1988
Factory Acceptance Test Completed	May 10, 1988
Systems Shipped to the FAA Technical Center	May 16, 1988
Systems Shipped to the FAA Academy	May 16, 1988
Provisioning Conference Completed	June 9, 1988
First System Delivered to Depot	June 10, 1988
Site Spares Delivered	July 1988
Maintenance Training Starts	July 1988
Systems Released for Development	August 1988
Last System Delivered to Depot	May 1989



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APPENDIX 2. MULTICHANNEL VOICE RECORDER MAINTENANCE CONCEPT

PREFACE

The maintenance concept for the Multichannel Voice Recorders (MCR) includes the general principles and procedures governing preventive, corrective, and diagnostic maintenance operations. This concept is based on specification requirements, contractual requirements and existing experience. These broad considerations are for use by those involved in developing maintenance manuals and final maintenance plans.



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1. SCOPE. This document establishes general guidelines and concepts of maintenance support for the Multichannel Voice Recorder (MCR) project.

2. BACKGROUND. In February 1986, a contract was awarded to Dictaphone Corporation, of Stratford, Connecticut, for 100 units of 10 channel and 25 units of 20 channel MCRs. A second contract which modified the equipment (by adding a 2-channel cassette tape recorder to the portable reproducer) was awarded to Dictaphone Corporation. This second contract was awarded in January 1988, and calls for 170 units of 10 channel and 123 units of 20 channel MCRs. MCRs will primarily become operational at Flight Service Stations (FSS), Automated FSSs (AFSS), and Air Traffic Control Towers (ATCT). Instruction manuals will be shipped concurrently with MVR hardware.

3. EQUIPMENT DESCRIPTION. Each MCR unit consists of two major subsystems: the recorder/reproducer unit and the reproducer unit.

3.1 RECORDER/REPRODUCER UNIT. This unit consists of a cabinet, dual decks, one take-up reel per deck, dual power supply system, audio system, failure detection system, automatic search system and a time/date code generating and reading system. This unit provides the RECORD, FAST FORWARD, REWIND, PLAY, STOP, and SEARCH functions, as well as the capability for setting and displaying search times, dates and channels.

3.1.1 CABINET. The cabinet housing the entire unit has the same dimensions as a standard 83-inch equipment rack. Each cabinet has a transparent glass/plastic door, equipped with keyed lock, which provides full security to all decks, controls, circuitries and recording tapes.

3.1.2 DUAL DECKS. One deck of the dual deck system functions as a standby for the other deck in the event of tape run-out, tape breakage and other recording interruptions. Each deck is capable of at least 24 hours of continuous recording time on 1/2-inch tape for the 10 channel recorder and 1-inch tape for the 20 channel recorder using 3600 feet of 1.0 mil base tape and operating at a recording speed of 15/32 Inches Per Second (IPS). Each deck swings out from the cabinet or mounting rack on hinged supports for ease of access to all components. Decks are completely serviceable from the front.

3.1.3 TAKE-UP REEL. Each deck of the dual deck system contains one take-up reel. All reels are standard 10 1/2 " NAB reels.

3.1.4 DUAL POWER SUPPLY SYSTEM. The dual power supply system provides power to each of the two decks, and provides back-up or alternate power for the total unit. Power supply circuit breakers are located on the front panel of the recorders.

3.1.5 AUDIO SYSTEM. All electronic circuits are modular in construction and designed for quick replacement by using plug-in

cards. A summary of audio parameter specifications is given in Table 3-1.

3.1.6 FAILURE DETECTION SYSTEM. The Failure Detection System electronically monitors the recording capability of each channel of the system while recording. On detection of failure in the primary deck, it automatically transfers operation from this deck to the standby deck with provision for manual override. This automatic switching feature safeguards against any loss of voice recording during failure.

3.1.7 AUTOMATIC SEARCH SYSTEM. This system can advance/rewind the tape at high speed to the message with the selected date and time. It also provides a manual override function.

3.1.8 TIME/DATE CODE GENERATING and READING UNIT. This unit multiplexes a time code signal with the recorded audio track to accurately log the time at which the recording was made. The multiplexed signal will become the recording of the voice communications along with the timing of its occurrence.

3.1.9 REMOTE MODE INDICATOR. The Remote Mode Indicator displays the status of each deck and provides an audible alarm with variable loudness control. The alarm can be switched ON or OFF as required. The indicator is enclosed in a container 12 inches high, 20 inches wide and 12 inches deep.

3.2 REPRODUCER UNIT. The reproducer unit consists of a cabinet, tape playback deck, automatic search system, 2-channel cassette recorder system and an audio system.

3.2.1 CABINET. The entire reproducer unit is transportable with carrying handles on a portable case or cabinet with dimensions of 34 inches in height, 24 inches in width and 20 inches in depth.

3.2.2 TAPE PLAYBACK DECK. This deck provides at least 24 hours of continuous playback time on 1/2 or 1 inch tape, using 3600 feet of 1.0 mil base tape, and operating at a speed of 15/32 IPS. The tape head assemblies are easily replaceable and the tape deck swings out from the cabinet for accessibility to all components. Each tape transport uses a standard 10-1/2" inch NAB reel.

3.2.3 AUTOMATIC SEARCH SYSTEM. Each reproducer unit has the automatic search capability and a foot control assembly to operate the search system.

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<u>PARAMETER</u>	<u>SPECIFICATION</u>
Minimum Dynamic Range	-25 dBm to 0 dBm
Crosstalk between Channels	minimum 34 db below 100% recording signal levels
Signal/Noise Ratio	minimum 35 db below 100% at recording level
Wow and Flutter	less than 1% weighted DIN at 15/32 IPS
Total Harmonic Distortion	less than 3%
Monitor Output Level	minimum of 1 Watt
Overall Frequency Response	4 db in 300-3000 Hz range, and roll-off rate of 6db/octave
Recorder Start Time	less than 0.5 seconds to stable speed

TABLE 3-1 AUDIO SYSTEM PARAMETERS

3.2.4 2-CHANNEL CASSETTE RECORDER. This built-in recorder is provided to record the time code in IRIG-E format (a 100 Hz positive signal phasing at 2.5 VPP +/- 1 VPP) on one channel and the selected channel on the other with the record feature being switchable to operate on either continuous or voice activated mode.

3.2.5 AUDIO SYSTEM. All audio system circuitry is modular and designed for quick replacement by using plug-in cards. Summary of the audio parameter specification are similar to those of the recorder/reproducer unit.

4. SYSTEM CONSIDERATIONS. Both the recorder/reproducer and reproducer units have power requirements of 115 volts, 60 Hz, single phase AC current. Further requirements, interfaces and supply are described below.

4.1 RECORDER/REPRODUCER. This unit has a single power supply providing power to each of the two decks and back-up power for the total unit. Terminals for the audio input lines are conveniently available and accessible from the rear or the front of the cabinet. The power supply circuit breaker for each deck is located on the front panel of the recorders.

4.2 TIME/DATE CODE GENERATING and READING UNIT. This unit is equipped with a battery back-up unit which will supply power during power fluctuations or outages for a period of at least 2 hours and will have an automatic charger. The built-in battery charger is capable of recharging the battery unit in less than 14 hours without monitoring or manual intervention.

4.3 INTERFACES. The recorder inputs are connected with the voice signal outputs from the on-site communication switching system using standard electrical wiring techniques.

4.4 SERVICE RESTORATION. Initial restoral of service is expected by substitution of spare parts. On-site spares should be utilized to the fullest extent possible. "Replace now - repair later" technique should be used if possible. If not, services shall be restored by repair or replacement of failed component in minimum time.

4.4.1 CONTRACTOR EQUIPMENT REPAIR. There is a contract option to provide equipment repair for 19 months after the date of delivery order. During the term of this contract option the contractor will furnish all qualified labor, materials, and tools to repair recorders requested by the Government. Emergency repair is to be accomplished within 24 hours after the receipt of any equipment component by the contractor. Routine repair is to be completed within 30 calendar days after date of receipt by the contractor.

5. TRAINING REQUIREMENTS. The existing training proposal requires the training of 250 Airway Facility (AF) Maintenance Technicians to support 125 previously acquired recorder systems. The new

procurement for recorder equipment will generate an additional requirement to train Maintenance Technicians using the same 2:1 ratio.

5.1 AF MAINTENANCE PERSONNEL. These requirements will be fulfilled with a resident study course at the Mike Monroney Aeronautical Center. The FAA Academy Airway Facilities Branch, AAC-940 will develop this course and all required training materials, using contractor furnished equipment and technical manuals. Contracting Officer's Technical Representative (COTR) responsibilities have been assigned to AAC-940.

5.2 AIR TRAFFIC (AT) PERSONNEL. These requirements are considered not significant enough to warrant development of an independent training course. Operational tasks for the recorders will be adequately described by on-site AF personnel during a 15 minute briefing. Formal training on recorder equipment will not be provided to AT personnel.

5.3 SPECIAL. Special training requirements for FAA depot personnel are not anticipated as analyzed and reported by AAC-940. FAA Exchange and Repair (E&R) support strategies negate the need for special training of FAA Technical Center personnel.

5.4 ATTRITION. Attrition training requirements for AF personnel is set at 10% of the initial training requirement annually.

6. MAINTENANCE and REPAIR. Maintenance shall be accomplished in accordance with the concept outlined in Order 5000.15 and the policy of field repair contained in Order 6000.18. On-site repair and maintenance shall be accomplished whenever possible.

6.1 CORRECTIVE MAINTENANCE. Corrective maintenance will be performed at three levels: 1.) on-site, 2.) Depot, and 3.) factory.

6.1.1 ON-SITE. On-site maintenance is limited to detection isolation and replacement of faulty line replaceable units (LRU) and other authorized components. Faulty LRUs will be replaced with serviceable spares by local maintenance technicians based on procedures developed by personnel at the Maintenance Control Center (MCC). The defective components will be returned for FAA Depot level analysis, testing, repair and disposition as appropriate. On-site repair of LRUs is not authorized. On-site maintenance tasks include maintaining inventory of spare parts by ordering replacement parts, exchanging defective modules designated for E&R with serviceable units from the FAA Depot, installing modification kits and minor field engineering changes, and diagnosis and repair of authorized modules and circuit cards after expiration of the warranty period.

6.1.2 DEPOT. Depot maintenance will consist of diagnostic and bench testing of faulty LRUs and repair or disposal as appropriate. The FAA Depot maintenance personnel will be responsible for performing diagnostic fault isolation on defective components,

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repairing selected and repairable modules and cards using Depot E&R procedures, and maintaining an inventory of spare parts.

6.1.3 FACTORY. Factory maintenance includes the repair of all faulty units returned to the factory during the first 19 months as determined in the repair contract. Factory repair may be recommended for those modules and circuit boards which have a low failure rate, are complex in nature or require expensive test equipment.

6.2 PREVENTIVE MAINTENANCE. Preventive maintenance will consist generally of cleaning, operational checks, lubrication and physical inspections. All magnetic recording heads require periodic cleaning.

7. WARRANTY. The contractor's standard commercial warranty applies to the equipment including repaired items, except that all magnetic heads are warranted for a minimum of three years from the date of final acceptance by the FAA.

Failed equipment under warranty should be returned pending disposition instructions from the headquarters, Depot or procurement office. Transportation costs for return of faulty equipment to and from the contractor will be borne by the contractor.

8. NONREPAIRABLE COMPONENTS. Nonrepairable or unserviceable components which fall under the scope of the E&R program shall be returned to the Depot on an E&R transaction in accordance with Order 4250.9. Other components shall be disposed of locally.

9. LOGISTICS. All supply support, spare equipment and systems will be stored at the FAA Depot. The contractor is required to provide a 1-year supply of parts-peculiar as defined in FAA-STD- 034 and approved by the Government at the Provisioning Conference as site level spares and/or Depot level spares. Contractor recommendations for sparing levels will be documented in the Provisioning Technical Documentation. At least one of each part- peculiar LRU will be provided at each site.

10. KNOWLEDGE and SKILLS. Facility technicians and engineers should have a knowledge of the MCR theory of operation. He/she will normally be a journeyman level technician with a communications background and will have completed training on solid-state devices.

11. TEST EQUIPMENT and TOOLS. Sufficient test equipment and tools will be made available on site to locate system malfunctions and perform routine maintenance. All sites will be provided with redundant equipment which can be used for test support (see table 11-1 for tools list).

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Jensen JTK-17 Tool Kit in Regular Case	D-17LST
Alignment tools	D60B300
Burnishers	D63B0B2
Calculator, decimal metric	D294B400
Feeler gauge	14B409
Hammer, ball peen, 4oz	D976B104
Handle, driver blades, 3 1/8"	D3B613
Handle, driver blades, 4 1/8"	D3B609
Hex driver blades, .050-3/16" pc.	D3B060
Hex key set, metric, 2-8mm, 8 pc.	D158B028
Icepick scribe	160B050
Knife, electrician's	D59B929
Mirror, inspection	35B016
Nutdriver blade, 3/16"-1/2"	D3B227
Oiler	140B200
Penlight, disposable	D221B100
Pliers, diagonal cutter, 1 1/4"	D1B003 or D1B005
Pliers, diagonal cutter, 5 1/4"	one of the above
Pliers, groove joint, 10"	D66B395
Pliers, long nose, 4 3/4"	D1B001 or D1B007
Pliers, long nose w/ cutter, 6 3/4"	one of the above
Pliers, retaining ring, external	D71B310 or D71B320
Pliers, retaining ring, internal	one of the above
Punch, center, 3/32"	D39B252
Punch, pin, 1/16"	D39B075
Punch, pin, 1/8"	unknown
Rule stainless, 6"	39B250
Scissors, thin-line	D112B060
Screwdriver, offset ratchet, slot/Phillips	185B035
Screwdriver, Phillips #0 x 1/2", pocket clip	D36B200 or D3B069 or D3B073 or D3B977
Screwdriver, Phillips #1 x 3"	one of the above
Screwdriver, Phillips #2, stubby	one of the above
Screwdriver, Phillips #2 x 4"	one of the above
Screwdriver, Phillips 3/32 x 2", pocket clip	unknown
Screwdriver, slotted, 1/8 x 4"	D36B126 or D36B141 or D36B144 or D36B188 or D36B212 or D36B264 or D36B566
Screwdriver, slotted, 1/8 x 8"	one of the above
Screwdriver, slotted, 3/16 x 3"	one of the above

TABLE 11-1. 10/20 CHANNEL DICTAPHONE RECORDER TOOLS LIST

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Screwdriver, slotted, 1/4", stubby	one of the above
Screwdriver, slotted, 1/4 x 4"	one of the above
Screwdriver, slotted, 5/16 x 6"	one of the above
Screwdriver set, jeweler's, 7 pc.	D65B235
Screwstarter, Phillips	D69B125
Screwstarter, slot	D69B105
Socket set, 1/4" drive, 14 pc.	D354B105
Solder aid, fork and hook	D244B100
Solder brush	D244B106
Solder removal braid	D149B015
Solder sample	D15B900
Soldering iron, 115v	D46B723
Spline "L" key set	D79B055
Spring tool, pull	63B077
Spring tool, push	63B079
Tweezer, reverse action	31B431
Wire crimper/stripper	D80B460
Wire stripper/cutter	D211B101
Wrench adjustable, 4"	D66B315 or D66B320
Wrench, adjustable, 6"	one of the above
Wrench set, ignition, 8 pc.	D332B860
Tool case w/pallets	D377B500

TABLE 11-1 (CONT.) 10/20 CHANNEL DICTAPHONE RECORDER TOOL LIST